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Children's experience of dental anxiety

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Summary

Background. Dental anxiety is common among children. Although there is a wealth of research investigating childhood dental anxiety, little consideration has been given to the child's perspective.

Aim. This qualitative study sought to explore with children their own experiences of dental anxiety using a cognitive behavioural therapy assessment model. **Design.** Face-to-face, semi-structured interviews were conducted with dentally anxious children aged 11 to 16 years. The Five Areas model was used to inform the topic guide and analysis. Data were analysed using a framework approach.

Results. In total, 13 children were interviewed. Participants described their experiences of dental anxiety across multiple dimensions (situational factors and altered thoughts, feelings, physical symptoms and behaviours). Participants placed considerable value on communication by dental professionals, with poor communication having a negative influence on dental anxiety and the dentist-patient relationship. **Conclusion.** This study confirms the Five Areas model as an applicable theoretical model for the assessment of childhood dental anxiety. Children provided insights about their own dental anxiety experiences that have not previously been described.

Introduction

Dental anxiety is common with an estimated prevalence of between 6% and 20% in children aged 4 to 18 years old.¹ In the UK, a national survey has identified high levels of dental anxiety in 14% and 10% of young people aged 12 and 15 years, respectively.² Childhood dental anxiety is associated with an increased prevalence of decayed and extracted teeth, more episodes of toothache and symptomatic attendance, and lower oral health-related quality of life.³⁻⁵ As dental anxiety in adolescence is likely to continue into adulthood, it can consequently have long-term negative implications for oral health outcomes.^{6,7}

Although there is a wealth of research investigating childhood dental anxiety, little consideration has been given to exploring dental anxiety from the child's perspective. Previous research has involved children completing measures of dental anxiety using self-report questionnaires.⁸ However, these measures have a limited focus, as they typically only assess severity of dental anxiety within a preconceived list of dental situational factors (e.g. local anaesthetic, specific dental treatments).⁹ Paediatric measures also have questionable relevance as they were developed when children's dental experiences differed vastly to current paediatric dental practices (e.g. questions relating to fear of people in white uniforms, or teeth being cleaned and scraped). Moreover, currently available paediatric self-report measures have been based on adult measures, whereby children have to fit their thinking into adult ideas.¹⁰ Therefore, much of the current research may fail to capture children's own experiences of dental anxiety.

There are a number of theoretical models of the maintenance of dental anxiety in adults, including: learning/behavioural theories; a cognitive vulnerability model, and a psychosocial/dental model.¹¹⁻¹⁴ The Five Areas model is a cognitive behavioural therapy (CBT) assessment model that describes the situational factors and altered thoughts, feelings, physical symptoms and behaviours that act together to maintain anxiety over time.¹⁵ The Five Areas model has a number of advantages when

compared to other models of dental anxiety, as it provides a structure to summarise the current problems and difficulties facing an individual, uses language that makes it amenable to use with children, and has clear clinical applications.¹⁶

Therefore, the aim of this study was to explore with children their own experiences of dental anxiety using the Five Areas cognitive behavioural therapy assessment model.

Methods

Participants

For this qualitative exploration, children aged 11 to 16 years with dental anxiety were purposively sampled to provide diversity of experiences about dental anxiety.¹⁷ The key participant demographic characteristics used for sampling were: gender; age; dental care setting (e.g. primary dental care, secondary dental care); living in areas of varying levels of deprivation; and ethnicity. Children were initially approached by a researcher (AM) based on clinician reporting of dental anxiety.¹⁸ The presence of dental anxiety was then confirmed verbally by participant self-report, although severity of dental anxiety was not measured. The age range of 11 to 16 years was selected to recruit participants who would be able to reflect on their experiences of dental anxiety within a cognitive behavioural therapy framework. Participants needed to have sufficient cognitive maturity to be able to think about and describe their thoughts about dental anxiety.¹⁹ A sampling matrix was used to monitor the recruitment of participants against key background characteristics. Children with severe communication difficulties, or those for whom interpreting services were required, were excluded due to the risk that their responses might be unintentionally altered during the process of being translated.

Study design

Data collection comprised face-to-face, semi-structured interviews with children. Qualitative interviews were used to facilitate a more comprehensive, adaptable and individual approach to understanding the breadth of children's experiences and perspectives of dental anxiety.²⁰ The nature of the study was explained to both potential participants and their parents/carers, with written consent obtained following a two week consideration period. Ethical approval for the study was granted by the NRES Committee York and Humber: Leeds West REC (13/YH/0163). Participants were given a choice for the location of the interview (e.g. home, university), and whether they wanted their parent/carer to be present. Each participant provided a pseudonym for the duration of the interview to maintain their confidentiality. The first interview was carried out by a researcher (ZM) who had extensive experience in conducting qualitative interviews with children. All subsequent interviews were conducted by a second dentally-qualified researcher (AM) who had received additional training in qualitative interviewing techniques. Neither researcher was directly involved with the provision of dental care to any of the participants at the time of the study. The audio content of the interviews was digitally recorded (Digital Voice Recorder WS-813, Olympus) and transcribed verbatim.

Theoretical model

The topic guide and analysis of the interviews were informed by the Five Areas model.¹⁵ Participants were asked about their thoughts, feelings, physical symptoms, behaviours and external factors (e.g. dental anxiety triggers and positive and negative modifiers) in relation to dental anxiety. During the interviews the topic guide was only loosely applied and participants were encouraged to share their own perspectives.

Data analysis

Recruitment of participants, data collection and analysis were conducted concurrently until data saturation occurred and no new ideas emerged. The data were analysed using a framework

approach.¹⁷ Four researchers (AM, ZM, JP and HDR) completed the initial familiarisation stage with the first five transcripts. Each researcher independently read and reviewed the transcripts to identify important and repeating ideas that emerged from the data, underpinned by the Five Areas model as the theoretical framework. Any disagreements in interpretation were resolved through discussion. A deductive approach was then conducted to organise the data into themes. Subsequently, each section of the transcripts was systematically reviewed, labelled and indexed on an electronic database (Excel 2010, Microsoft Office), according to the theme and subtheme, by a single researcher (AM). Data with the same index number were then brought together for further discussions amongst the researchers (AM, ZM, JP and HDR) to modify the subthemes. Finally, a thematic framework was developed where evidence to support the subthemes was traced to the original text from each participant.²¹ Following analysis of the first five transcripts, further interviews were conducted. For each subsequent transcript additional discussions were carried out to fully elucidate and refine each identified theme and subtheme, until a stage was reached where no new ideas emerged and data saturation was accomplished. All interviews were conducted on a conversational basis, whereby parents/carers, when present, were able to make contributions to the discussions. These additional comments were not included in the framework analysis, but did act to provide context and aid interpretation.

Results

Data saturation was reached when 13 children had been interviewed. Overall, 17 children were approached, but four declined to participate following the consideration period. Demographic details for the participants are presented in Table 1. All interviews were completed between January and April 2014. The participants were recruited from two general dental practices, the community dental service and a paediatric dentistry unit within an NHS dental teaching hospital. Eleven interviews were conducted in the participant's home. Only one participant chose to be interviewed without their parent/carer present. The participants all had experience of restorative dental

treatment and extractions either with local anaesthetic, inhalation sedation and/or general anaesthetic.

The five main themes from the Five Areas model were situational factors; and altered thoughts, emotions, physical symptoms and behaviour. The additional subthemes that emerged from the data are presented in Figure 1.

1) Situational factors

Situational factors are the external elements that surround a child and influence their dental anxiety (e.g. parents, dental team, specific dental equipment).²² Within this theme, two main subthemes were identified. These were: communication and information-sharing; and potential threatening stimuli within the clinical environment.

a) Communication and information-sharing

Children identified that both the dental team and their parents/carers had a role in influencing their dental anxiety. With respect to the dental team, the person providing their dental care (e.g. dentist, dental therapist) was given principle importance during their accounts. Participants described the qualities of an idealised dental team member as someone professional, honest, and who demonstrates warmth and friendliness towards them. They perceived that if their dental professional possessed those characteristics then they would suffer less dental anxiety as a result.

“Like everyone’s really smiley, and like really happy...it makes you feel more welcomed and more like less threatened as it were.” (Lucy, 13 years old).

Participants discussed information-sharing during their accounts. Children wanted the dental team to tell them what was going to happen during a dental visit, and did not want anything kept hidden

from them. It was important to have this information explained in an age-appropriate manner, whereby the child did not feel patronised.

"Well tell me like exactly what they would do, cause I don't like surprises." (Claire, 14 years old).

"She was just annoying me...Talking to me like I was five." (Katy, 13 years old).

However, conflicting views were expressed about how much detailed information should be provided, with some participants wanting to be fully informed and given specifics, and others finding detailed information overwhelming.

Interviewer: "Some people have said they like to see everything beforehand, and have it explained to them how everything works."

Danielle: "I do, but then I just get upset and don't want it." (Danielle, 11 years old).

Interestingly, providing a child with detailed information did not appear to necessarily reduce the anxiety they were experiencing, or guarantee that they would then agree to proceed.

"I would if somebody said, 'Would you like to see the needle?' I would ask to see it, but I probably wouldn't let them do it." (Sophie, 12 years old).

As a possible complication, once a plan had been agreed with the dental team the participants expressed intolerance to any unexpected changes, such as change of clinical operator or provision of different dental treatment.

"They did one (injection) and then I was like really relieved and happy it was done, and then they were like why don't we do 3 more and I was like 'errrr'." (Amelia, 14 years old).

Participants also wanted to be given time to consider what they had been told and not to feel pressured or rushed into proceeding immediately with the dental treatment.

“Because every other time I did the injection I’d like open my mouth, and I’d close it again, cause I wasn’t ready.” (Amelia, 14 years old).

As with the dental team, children felt strongly that their parent/carers should be honest with them and tell them beforehand about a dental appointment. It was acknowledged that this might lead to increased worry and distress at home, but being worried was considered preferable to not being provided with the information in the first place. However, children generally had conflicting views about the role of their parent/carers. Some participants found them to be a great source of comfort and reassurance, whilst others found parental anxiety an additional burden.

Louise’s Mum: “For some children they want to have their Mum to hold their hand, but my anxiety did definitely have an effect on Louise as well.”

Interviewer: “So what made the difference when your Mum wasn’t in the room?”

Louise: “There was not so much negativity surrounding it.” (Louise, 14 years old).

b) Potential threatening stimuli within the clinical environment

The dental environment was found to be an overwhelming, anxiety-provoking sensory experience. Participants discussed loud noises they had heard including cries from other young patients, strange sounds from dental equipment, and frightening cracks of bone as teeth were removed. Others gave accounts of seeing sharp and threatening instruments on trays in front of them, observing distress in other children, the feel of equipment at the back of their mouth, and being subject to unusual and strange tastes. Some participants expressed specific anxiety about dental local anaesthetic injections, perceiving them as being painful to endure.

“And it’s like it stings, it doesn’t hurt, it stings. It stings really badly like 10,000 bees stinging you inside your mouth.” (Michael, 13 years old).

Even the anticipated sensation of numbness associated with local anaesthetic was seen as having negative implications.

“He put in an injection and I couldn’t talk for a while.” (Lucy, 13 years old).

Within the Five Areas model dental anxiety is not potentiated by the described situations *per se*, but rather how an anxious individual interprets those situational factors.¹⁵ Characteristically, anxious children have an increased perception that a non-threatening situation is dangerous, coupled with a decreased perception of their own coping ability. Consequently, negative thinking patterns can develop. In anxiety disorders negative thoughts are persistent and intrusive²³

2) Altered thoughts

Within the theme of altered thoughts, four sub-themes emerged from the data: negative predictions (catastrophising); negative social judgements (mind-reading); reliving traumatic dental experiences; and distraction strategies.

a) Negative predictions

Numerous negative expectations were reported. Participants discussed that if they had dental treatment it would be painful and that they would not be able to stop the dentist, or that a clinical error could occur and cause them harm.

*“What if they do something wrong? They slip, and then I swallow something and it chokes and I die.”
(Michael, 13 years old).*

Violent mental images about suffering physical injury as a result of dental treatment were also described.

“She looked like a butcher...It’s like she may as well got an axe and started chopping at my face but she had tissue.”(Claire, 14 years old).

b) Negative social judgements

Strong negative opinions were expressed about the dental team, and what children perceived the dental team thought of them. Specifically, some participants thought that the dental team would think they had 'bad' teeth. They were convinced that irrespective of their actions to look after their teeth, the dentist would find something wrong and they would need further treatment. Consequently, they believed the dentist to have made negative judgements about them, considering them to be 'unhealthy' or 'lazy', and failing to believe them when they told the truth about sugar consumption.

"Cause I hardly have any sweets, and then they always say I have loads of sweets." (Bob, 11 years old).

Moreover, they alleged that if a dentist thought badly of them then the dentist would obtain pleasure from causing them suffering.

"I bet she loves me coming because she's got to do lots of stuff on me, and she can experiment on me like a doll." (Emily, 14 years old).

c) Reliving traumatic experiences

Distressing accounts were also provided of previous negative dental experiences. The descriptions included portrayals of vulnerability and loss of control, with the participants remembering dark rooms, being unable to speak or close their mouths, and attempts to try to stop the dentist being ignored. Clearly, these memories were persistent and had affected participants for long periods of time.

"Yeah, and then for about a year after I had it done it's kind of, it's still the same memories was going around in my head, the same day every night." (Sophie, 12 years old).

d) Distraction strategies

Participants discussed recovering from negative dental experiences, and being able to utilise their learning as a positive cognitive coping strategy to challenge their negative thoughts. In addition, children appeared to employ a range of other cognitive strategies in the dental environment, including thoughts of when they had been happy, activities with friends, or wishes coming true.

“I just shut my eyes and like, and not to be stupid, just pretend that you’re in a happy place...On beach with the sea trickling along.” (Joe, 12 years old).

3) Altered feelings

According to the Five Areas model, unhelpful thoughts affect emotional state and physical symptoms. Characteristically, fear and anxiety result in a distressing negative affective state and activation of the autonomic nervous system. Reciprocally, these distressing feelings and symptoms can lead to further deterioration in the already established unhelpful thinking patterns, with unhelpful thoughts becoming more negative and extreme.²³

Within the theme of altered feelings, subthemes for the emotions experienced before and during a dental visit, and after a dental visit, were described.

a) Before and during dental visits

Many emotive words were used to illustrate feelings and negative affect. Broadly these could be grouped into fear-based feelings (e.g. “petrified”, “terrified”), and anxiety-based feelings (e.g. “flustered”, “trapped”, “uncomfortable”). Children suffered considerable emotional distress and spoke of the behavioural consequences of this (e.g. having “meltdowns”, being in “floods of tears” and “screaming with fear”). Some were embarrassed by their dental anxiety, comparing themselves unfavourably to their dentally successful peers. Others expressed strong anger, principally with the dental professional who provided their treatment.

*"Angry...Because they didn't listen. They lied. I wanted to shout at them, "So why didn't you listen."
(Danielle, 11 years old).*

b) After dental visits

After dental appointments children similarly experienced a range of emotional responses. Participants described feeling "exhausted" and "drained" by what they had faced. However, if the visit had been successful, participants described positive emotional experiences.

"Feel a bit proud. I've done it. I've faced my fears." (Chloe, 11 years old).

Anticipation of a reward, including being able to embark on orthodontic treatment, added to their positivity. Interestingly, participants also spoke about experiencing positive emotions when they had managed to successfully avoid having dental treatment.

Interviewer: "When your Mum said you didn't have to go, she was going to cancel your appointment, what did it feel like then?"

Claire: "Just like a weight lifted off your shoulder." (Claire, 14 years old).

4) Altered physical symptoms

During an episode of dental anxiety, different physiological symptoms were experienced, characteristically depicting features of autonomic arousal (e.g. sweating, decreased gastric motility, cutaneous vasoconstriction).²⁴ Symptoms described included: *"sweating and shaking"*; *"clammy palms"*; *"having butterflies"*, *"stomach-aches"*, *"feeling sick"* and *"becoming pale"*. Other somatic manifestations were sleep disturbances, and symptoms of temporomandibular dysfunction, including tooth clenching and mandibular pain.

5) Altered behaviour

In perceived threatening situations, behavioural responses to prevent harm include: escape/avoidance; aggression; and immobility and hiding.²⁵ In the survival context, avoiding the danger may be associated with less risk of harm, whilst becoming aggressive or immobile are reasonable defensive stances should all else fail.²⁵ In anxiety disorders unhelpful thinking patterns, feelings, and physical symptoms can lead an individual to make unhelpful behavioural choices in an attempt to alleviate the distress they are experiencing.²⁶ However, such behaviours are ultimately self-defeating.²² Within this theme, subthemes of avoidance, aggression and behavioural coping strategies were evident from the data.

a) Avoidance

A number of strategies were employed by participants to avoid attending an appointment, or to hinder dental activities once in the dental environment. Children spoke of trying to cajole their parents/carers into cancelling dental appointments. This included attempts to deceive their parents/carers by claiming to be feeling unwell, or by down-playing dental problems.

Interviewer: "Have you ever made excuses not to go to the dentist?"

Samantha: "Tried to. Like I'm poorly and I can't go. I feel ill." (Samantha, 15 years old).

Once in the dental chair, participants discussed trying to delay their dental treatment. Examples were given where participants forced siblings to have their dental visit first, stalled by asking multiple questions, or refused to open their mouths.

"They can't force your mouth open or anything, so I thought to myself, 'Well if I keep it shut they can't really do anything'." (Sophie, 12 years old).

As a last resort, negotiations with the dental team were attempted, whereby children volunteered to carry out treatment procedures by themselves.

“I said I was going to pull it but they wouldn’t let me” (Danielle, 11 years old).

b) Aggressive behaviour

Participants described aggressive behaviour they had shown towards the dental team. Mostly, this took the form of making unkind and discourteous statements. It was generally reported by parents/carers that this was uncharacteristic of them. Although, participants were not physically aggressive, they described thoughts of wanting to hurt their dentist.

“Last time I nearly hit somebody...on purpose. I got really annoyed like when people mess around with you like this, pulling your face and like opening your mouth and stuff, it gets really annoying so I was like stop it! You want to hit them and stuff.” (Michael, 13 years old).

c) Behavioural coping strategies

Not all the behaviours reported by the children were unhelpful. Behavioural coping strategies that enabled the child to complete treatment included holding the dental nurse’s hand and listening to music,

Discussion

The aim of this study was to explore children’s experiences of dental anxiety using the Five Areas cognitive behavioural therapy assessment model to provide a structure for their experiences. This study is among the first to ask children directly about their dental anxiety, and to be underpinned by a theoretical model for the construct of dental anxiety.²⁷ The participants within this study described their experiences relating to each of the factors within the Five Areas model vividly. Therefore, the findings support the use of this cognitive behavioural therapy model for understanding childhood dental anxiety, with applications for the assessment and treatment of dental anxiety.

Common recurring themes described by the dentally anxious participants included: making negative predictions about what could happen (e.g. expectation of pain, clinical error, suffering harm, being powerless); reliving traumatic dental experiences (e.g. memories, nightmares); avoiding dental care (e.g. deceptive strategies, negotiation); and experiencing negative affective states (e.g. fear, anxiety, anger, shame, embarrassment), and physical symptoms (e.g. autonomic arousal). In this study a deductive, top-down approach was utilised.¹⁷ However, as further evidence for the helpfulness of the Five Areas model in describing and making sense of child dental anxiety, the findings are consistent with previous qualitative studies involving dentally anxious adults that used inductive analysis (e.g. Grounded Theory),^{28;29} or where novel methods were used, such as evaluating videos about dental anxiety that were posted on social media.³⁰ Although the child and adult experience of dental anxiety have similarities, a difference was apparent in relation to avoidance of dental care.²⁹ Unlike adults, children do not make the decision themselves about dental attendance. The participants in this study described attempts to deceive or pressure their parents into cancelling appointment. Correspondingly, parents have reported that they can feel overwhelmed and unable to convince their child they needed to attend.³¹ The multi-dimensional nature of the experiences described by children also highlights potential limitations of the currently available paediatric self-report measures which may only capture part of children's overall experience of dental anxiety.

Evidenced within the examples given across the themes was the role of the dental professional within the children's experiences. Consistent with studies with adults,³² participants in this study identified empathetic dental professionals as having a positive influence on dental anxiety. Conversely, criticism by a dental professional, even when well-intentioned during the provision of oral health advice, acted to promote dental anxiety in children. In this study, children placed considerable value on communication and information-sharing. This is consistent with findings from a study of children aged 10 to 13 years from New Zealand in which children attending dental appointments reported that they wanted to be given factual information, even if it was unpleasant

to hear.³³ However, dental professionals allocate little time to discussing the specifics of a dental visit with young patients, and established routines and unequal power relationships may preclude children from being able to ask questions themselves.³⁴ To complicate matters, dentally anxious children in this study did not have uniform information needs. Regardless, if a dental professional failed to meet their needs, the consequences were harmful for the dentist-patient relationship, trust in the dental profession and ongoing maintenance of dental anxiety. Therefore, consideration should be given to providing training to dental professionals, and to develop communication tools that promote positive dentist-patient interactions, and that can meet the needs of individual young patients.

There are a number of limitations to this study. Firstly, it was challenging to recruit participants from certain population groups; notably, male participants, particularly older adolescents, and children from ethnic minorities. Possible explanations include social and cultural barriers to admitting dental anxiety, willingness to participate in interviews, and language difficulties^{35;36} It is not known if these barriers to study participation could also have had impacts on children's experiences of dental anxiety. It should also be noted that due to the cognitive tasks required of participants in this study only children aged 11 to 16 years were included. It is possible that younger children would have described different experiences of dental anxiety. Additionally, nearly all participants, when given the option, chose to be interviewed with their parents/carers. It is also possible that parent/carer presence had an influence on participants' response. As the aim of the study was to explore the overall experiences of dental anxiety, participants were not asked to complete an objective dental anxiety measure. However, the data suggest a range of severities of dental anxiety were included. This study was also conducted with children from only one UK region. Consequently, some of the language used by participants was based on local colloquialisms, and may not be applicable to the child population in general. Finally, both interviewers in this study were qualified dentists, with potentially implications for the way questions were phrased, and the interpretations made. To

reduce the impact of this a non-dentally qualified member of the research team was involved in the development of the topic guide and analysis.

Bullet points

What this paper is important to paediatric dentists

- 1) This is one of the first studies to explore the multidimensional aspects of childhood dental anxiety underpinned by a theoretical model.
- 2) Participants in the study were asked directly about their own experiences of dental anxiety, and provided insights that have not previously been described.

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Conflict of interest

Part of the grant funding paid Five Areas Ltd to develop the course book and linked training resources used in this grant. CW is shareholder and director of this company which commercialises these resources. His wife is Company Secretary and shareholder in the same company. CW is President of the British Association for Behavioural and Cognitive Psychotherapies (www.babcp.com) a charity that promotes CBT.

References

1. Klingberg G, Broberg AG. Dental fear/anxiety and dental behaviour management problems in children and adolescents: a review of prevalence and concomitant psychological factors. *Int J Paediatr Dent* 2007; 17: 391-406.
2. Health and Social Care Information Centre. Children's Dental Health Survey 2013 Report 1: Attitudes, Behaviours and Children's Dental Health: Health and Social Care Information Centre; 2015. Available from: <http://www.hscic.gov.uk/catalogue/PUB17137/CDHS2013-Report1-Attitudes-and-Behaviours.pdf>.
3. Nuttall NM, Gilbert A, Morris J. Children's dental anxiety in the United Kingdom in 2003. *Journal of Dentistry* 2008; 36: 857-860.
4. Wogelius P, Poulsen S. Associations between dental anxiety, dental treatment due to toothache, and missed dental appointments among six to eight-year-old Danish children: a cross-sectional study. *Acta Odontol Scand* 2005; 63: 179-182.
5. Luoto A, Lahti S, Nevanpera T, Tolvanen M, Locker D. Oral-health-related quality of life among children with and without dental fear. *Int J Paediatr Dent* 2009; 19: 115-120.
6. Thomson WM, Broadbent JM, Locker D, Poulton R. Trajectories of dental anxiety in a birth cohort. *Community Dent Oral Epidemiol* 2009; 37: 209-219.
7. McGrath C, Bedi R. The association between dental anxiety and oral health-related quality of life in Britain. *Community Dent Oral Epidemiol* 2004; 32: 67-72.
8. Al-Namankany A, de Souza M, Ashley P. Evidence-based dentistry: analysis of dental anxiety scales for children. *Br Dent J* 2012; 212: 219-222.
9. Porritt J, Buchanan H, Hall M, Gilchrist F, Marshman Z. Assessing children's dental anxiety: a systematic review of current measures. *Community Dent Oral Epidemiol* 2013; 41: 130-142.
10. Eiser C, Morse R. Quality-of-life measures in chronic diseases of childhood. *Health Technol Assess* 2001; 5: 1-157.

11. Armfield JM. Cognitive vulnerability: a model of the etiology of fear. *Clin Psychol Rev* 2006; 26: 746-768.
12. Berggren U, Meynert G. Dental fear and avoidance: causes, symptoms, and consequences. *J Am Dent Assoc* 1984; 109: 247-251.
13. de Jongh A, Muris P, ter Horst G, Duyx MP. Acquisition and maintenance of dental anxiety: the role of conditioning experiences and cognitive factors. *Behav Res Ther* 1995; 33: 205-210.
14. Armfield JM. Towards a better understanding of dental anxiety and fear: cognitions vs. experiences. *Eur J Oral Sci* 2010; 118: 259-264.
15. Williams C. *Overcoming depression and low mood*. Fourth ed. London: CRC Press, Taylor & Francis Group, 2013.
16. Porritt J, Marshman Z, Rodd HD. Understanding children's dental anxiety and psychological approaches to its reduction. *Int J Paediatr Dent* 2012; 22: 397-405.
17. Ritchie J, Lewis J, McNaughton Nicholls C, Ormston R. *Qualitative Research Practice*. Second ed. London: SAGE Publications Ltd., 2014.
18. Holmes RD, Girdler NM. A study to assess the validity of clinical judgement in determining paediatric dental anxiety and related outcomes of management. *Int J Paediatr Dent* 2005; 15: 169-176.
19. James AC, James G, Cowdrey FA, Soler A, Choke A. Cognitive behavioural therapy for anxiety disorders in children and adolescents. *Cochrane Database Syst Rev* 2015; 2: CD004690.
20. Stewart K, Gill P, Chadwick B, Treasure E. Qualitative research in dentistry. *Br Dent J* 2008; 204: 235-239.
21. Smith PA, Freeman R. Remembering and repeating childhood dental treatment experiences: parents, their children, and barriers to dental care. *Int J Paediatr Dent* 2010; 20: 50-58.
22. Williams C, Garland A. A cognitive-behavioural therapy assessment model for use in everyday clinical practice. *Advances in Psychiatric Treatment* 2002; 8: 172-179.

23. Williams C, Garland A. Identifying and challenging unhelpful thinking. *Advances in Psychiatric Treatment* 2002; 8: 377-386.
24. McGeown JG. *Master Medicine: Physiology E-Book: A core text of human physiology with self assessment*. ed. Churchill Livingstone, 2007.
25. Willumsen T, Haukebo K, Raadal M. Aetiology of dental phobia. In: Ost LG, Skaret E, editors. *Cognitive Behavioural Therapy for Dental Phobia and Anxiety*. 1st ed. Malaysia: Wiley-Blackwell; 2013. p. 45-61.
26. Garland A, Fox C, Williams C. Overcoming reduced activity and avoidance: a Five Areas approach. *Advances in Psychiatric Treatment* 2002; 8: 453-462.
27. Armfield JM. How do we measure dental fear and what are we measuring anyway? *Oral Health Prev Dent* 2010; 8: 107-115.
28. Abrahamsson KH, Berggren U, Hallberg L, Carlsson SG. Dental phobic patients' view of dental anxiety and experiences in dental care: a qualitative study. *Scand J Caring Sci* 2002; 16: 188-196.
29. Cohen SM, Fiske J, Newton JT. The impact of dental anxiety on daily living. *Br Dent J* 2000; 189: 385-390.
30. Gao X, Hamzah SH, Yiu CK, McGrath C, King NM. Dental fear and anxiety in children and adolescents: qualitative study using YouTube. *J Med Internet Res* 2013; 15: e29.
31. Hallberg U, Camling E, Zickert I, Robertson A, Berggren U. Dental appointment no-shows: why do some parents fail to take their children to the dentist? *Int J Paediatr Dent* 2008; 18: 27-34.
32. Zhou Y, Cameron E, Forbes G, Humphris G. Systematic review of the effect of dental staff behaviour on child dental patient anxiety and behaviour. *Patient Educ Couns* 2011; 85: 4-13.
33. Jones LM, Huggins TJ. The rationale and pilot study of a new paediatric dental patient request form to improve communication and outcomes of dental appointments. *Child Care Health Dev* 2013; 39: 869-872.
34. Watson R. *An exploration of children's dental anxiety: triggers, coping and needs.*: Massey University; 2009.

35. Townend E, Dimigen G, Fung D. A clinical study of child dental anxiety. *Behav Res Ther* 2000; 38: 31-46.
36. Folayan MO, Idehen EE, Ojo OO. Dental anxiety in a subpopulation of African children: parents ability to predict and its relation to general anxiety and behaviour in the dental chair. *Eur J Paediatr Dent* 2004; 5: 19-23.
37. Department for Communities and Local Government. The English indices of deprivation 2010. London: Crown copyright, 2011.

Table 1.**Demographic details for participants**

Pseudonym	Age (years)	Gender	Recruitment location	Deprivation quintile*	Dental anxiety (Clinician reported)	Ethnicity
Chloe	11	Female	Dental Hospital	2	High	White British
Samantha	15	Female	General Dental Practice	5	Mild	White British
Danielle	11	Female	Dental Hospital	5	Moderate	White British
Amelia	14	Female	Dental Hospital	4	High	White British
Joe	12	Male	Dental Hospital	3	High	White British
Lucy	13	Female	Dental Hospital	3	Moderate	White British
Bob	11	Male	Dental Hospital	2	Mild	White British
Emily	14	Female	General Dental Practice	4	Mild	White British
Sophie	12	Female	Dental Hospital	2	High	White British
Katy	13	Female	Salaried Dental Service	2	High	White British
Louise	14	Female	Dental Hospital	5	Very high	White British
Claire	14	Female	Salaried Dental Service	5	Moderate	White British
Michael	13	Male	Dental Hospital	4	High	Mixed

*Deprivation quintiles based on Index of Multiple Deprivation 2010 rank ³⁷. Deprivation quintile 5 represents the most deprived lower super output area ranks across England.

Figure 1. Thematic framework outline (adapted from Williams and Garland²²)

